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ABSTRACT

The propositions and inferences in a narrative story can be classified into two sets: the structurally explicit are those concerned with the central theme or structure of the story, and the incidentally explicit deal with information peripheral to this theme. This study compared readers and listeners from grades three and five in their comprehension of a narrative story. As predicted, the listeners paid more attention to meaning, recalling structural information on the theme of the story and making errors on incidental information. The readers, on the other hand, were more aware of content and recalled more of the incidental, nonrelevant details. In addition, readers were more accurate than listeners in their judgments and in their differentiation of implicit from explicit statements. (HAI)

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On the Bias of Oral and Written Language in the Drawing of Inferences from Text*

by

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The Ontario Institute for Studies in Education

Paper presented at the annual meeting of the

American Educational Research Association

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ABSTRACT

The propositions in a narrative text can be classified into two sets: those concerning the central theme or structure of the story (Structural Explicit) and those which are about information peripheral to the main story theme (Incidental Explicit). Similarly, the inferences which can be deduced from a text can be divided into two sets: those which are necessary for the coherence of the story (Structural Implicit) and those which provide irrelevant detail (Incidental Implicit).

In this study Readers and Listeners from Grades 3 and 5 are compared in their comprehension of a narrative text. As predicted, the listeners were found to pay more attention to what was meant, recalling structural information and making more errors on incidental information. Readers on the other hand, were more aware of what was said, and were able to recall more of the incidental non-relevant details. In addition, the readers were more accurate in their differentiation of implicit from explicit statements.

It appears, then, that readers and listeners do adopt different strategies when comprehending narrative texts. Listeners pay attention to the theme of the story, and build a coherent representation of what was meant; readers are able to pay closer attention to the explicit propositions per se, to what was said.

On the Bias of Oral and Written Language in the Drawing of Inferences from Text

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In general, our memory for what we have heard or read is not perfect. Various parts of the story or conversation are forgotten. Other items are recalled even though they were never explicitly mentioned. This phenomenen is not a new discovery (Bartlett, 1932), but has recently been the focus of much research (Bower, 1976; Stein & Glenn, 1978; Warren, Nicholas & Trabasso, 1978) which shows that we tend to remember important information and forget irrelevant detail. One concern of this paper is to determine whether written as opposed to orally presented text disposes comprehenders to treat that text differently.

Few investigators have included reading versus listening to verbal material as a variable in experimental design. Two notable exceptions are Begg (1971), and Sachs (1974) both of whom found that readers retained somewhat more of the surface structure features of sentences than listeners. However, an analysis of the functions of language in speech and writing, indicates that we may expect there to be more important differences between reading a narrative versus listening to that same narrative.

Language serves at least two primary functions, the ideational and the interpersonal (Halliday, 1970). An alternative means of differentiating these functions is in terms of sentence meaning and speaker's meaning (Grice, 1975). We may consider the sentence meaning to be the aspects of meaning that bear on the Truth and Falsity of the sentence per se.

For example, the ideational or sentence meaning of the utterance "It is cold in here" is precisely that the temperature in the place "here" is below that normally to be expected. The sentence meaning is appropriately derived if the listener arrives at this interpretation.

However, in uttering the statement "It is cold in here" the speaker may well have intended the listener's interpretation to go beyond the explicit utterance to something like, "Shut the door". This is the interpersonal aspect, the speaker's meaning, and it is a successfully derived communication to the extent that the listener arrives at the speaker's intention.

Note that the speaker's meaning is implicit while the sentence meaning is explicitly lexicalized. But it is not only the speech act aspects of the speaker's intention which can be left implicit in a message; other important aspects of the speaker's intention can equally well be left implicit. Grice (1975) has called one such set of these implicit but invited inferences conversational implicatures. Schank (1975), Hildyard & Olson (ref. note 1) have referred to this set as Enabling Inferences. It is essential that the reader/listener makes these conversational implicatures or Enabling Inferences in order to follow some conversations and some continuous discourse. To illustrate, if told "There was a terrible squeal of brakes. They saw the girl lying in the road." it is generally necessary to infer that a car or truck struck the girl. Not only is this inference important because it serves to tie together two distinct premises, but the speaker (or writer) is aware that the listener (or reader) will, in all probability, import this premise. According to the cooperative principal

holding between the speaker and listener, if it were not the case that the girl was struck by the vehicle which produced the loud squeal of brakes, then the speaker would have said no.

Not all pragmatic inferences are critical to the comprehension of the discourse or conversation as a whole. There are a set of Pragmatic inferences which serve to elaborate in a non-critical way, upon the given information. Thus, if told "The cookies are in a container." we may reasonably infer "The cookies are in a cookie jar". These pragmatic inferences tend to instantiate the sentence through the generation of information which could plausibly be found in the listener/reader's knowledge structure.

The interpretation of a conversation or a discourse can involve, therefore, far more than a literal interpretation of the explicitly presented sentences. Comprehension can also include the extraction of the speaker's intention, the generation of inferences essential to the coherence of the discourse or conversation and the generation of inferences peripheral to the central theme. The critical question is whether readers and listeners process these various aspects of meaning in the same way.

Oral conversation occurs in a social context with the result that questions concerning perceived social status, expectancies and the like will be of central importance to the speaker and the listener. The speaker can indicate his awareness of the relative status holding between the participants through selection of the most appropriate utterance to convey the desired intention (i.e., the selection of "It <u>is</u> cold in here" as opposed to "Please shut the door".) In addition, in oral language, much of the message can be left implicit, since the speaker can actively check to deter-

mine whether or not inferences of central importance were in fact derived by the listener. In written language, on the other hand, the reader and writer do not share the same context and are separated in space and time. The writer cannot test to see that the reader has derived all the necessary inferences, so more of these must be made explicit. It is, of course, the sentence meaning which is represented in the sentence per se, hence we may argue that writing serves to specialize language towards sentence meaning rather than speaker's meaning while conversation serves to specialize language towards speaker's meaning rather than sentence meaning (Olson, 1977).

Given these specializations of oral and written language, we may now question whether readers and listeners do, in fact, employ different strategies when interpreting verbal material. Since oral language is transitory in nature, we may expect that listeners will have to devote a large portion of their processing capacity to building a coherent representation of the message. Listeners should, therefore, concentrate more on statements which are central to the theme of the message, incorporating Enabling inferences into their interpretations when necessary; paying attention primarily to what was meant. Readers, on the other hand, have the message available to them for repeated scanning, so are able to pay a closer attention to specific details, less relevant information and to the explicit meanings; to pay attention to what, in fact, was said. As such we may expect readers to be far more aware of which statements were actually contained in the message as opposed to those which are compatible with the information but were not explicitly stated. Indeed, we may predict that listeners will be unable to differentiate between those statements central to the discourse structure which were presented explicitly from those which were inferred.

Two main hypotheses then, formed the focus of this study. Firstly, that in understanding a narrative story, listeners would attempt to build a representation which honors primarily central or structural information. Less relevant or peripheral details will not be remembered. Readers, however, are able to pay attention to these peripheral details and should be better able to verify statements concerning non-relevant details. Secondly, readers should be more aware than listeners of what statements were actually presented in the narrative. The listeners should be particularly inaccurate in their judgements of those statements central to the story structure but which were in fact implicit.

To test these hypotheses, children from two Grade levels (Grades 3 and 5) either read or listened to four short narrative stories. They subsequently selected a set of statements in a forced-choice paradigm which they considered to be most appropriate to the story theme. They next judged whether the statement they had selected as most appropriate had actually been presented in the story.

METHOD

Subjects. 36 children from each of Grades 3 and 5 participated in the study. They were tested in four groups of 18. Half the children in each grade level listened to the stories and half read them.

Materials. Four different narrative stories 12 to 14 lines long were written. The stories described common childhood events. All the stories had been used in previous studies and were known to be within the reading competence of the average third grade child.

The stories were accompanied by four different classes of statements as follows:

Structural Explicit. These were statements which were explicitly presented in the story and which were concerned with propositions central to the structure or theme of the story.

Structural Implicit. These statements also concerned facts central to the main story structure, but were never presented explicitly and were, therefore, inferred. Structural Implicit statements are equivalent to the Enabling Inferences (Conversational Implicatures) described earlier.

Incidental Explicit. These were statements about details not relevant to the structure or theme of the story as a whole. The statements concerned non-relevant explicitly mentioned facts.

Incidental Implicit. This last statement type included statements about non-relevant details which could be inferred from the story. Incidental Implicit statements are equivalent to the Pragmatic Inferences described earlier.

A story together with a set of statements are shown in Table 1. Each story was accompanied by 12 statements, such that across the four

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Insert Table 1 about here

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stories 12 exemplars of each statement type were prepared.[1]

The statements were presented in a forced choice format and the subject was required to select the most appropriate alternative. The

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[1]Two pilot studies were conducted with adults to ensure the validity of the Structural/Incidental and Implicit/Explicit dimensions. On the basis of these pilot data several items were rewritten and others were discarded. The 48 remaining statements were the ones ultimately used in the study.

two alternative statements were written so that only attention to the story itself would permit the selection of the correct alternative. That is, given the general story theme either alternative would be feasible, but in the context of the specific story details one alternative was clearly more appropriate. To illustrate, the two alternative statements for the Structural Implicit statement shown in Table 1 were as follows:

1A. Susan and Jonathan found a bird egg.

1B. Susan and Jonathan found a stone.

The selection of A versus B as the most appropriate statement was randomized across the total set of statements. The order of presentation of the set of statement types for each story was arranged such that an answer to an early statement would have minimal effect on an answer to a later statement.

Two distractor tasks were also prepared, one for the readers and one for the listeners. These distractor tasks were presented between a story and its accompanying statements. Different tasks were used for the two groups in an attempt to ensure that the interference effects would be equivalent across the two modes of presentation (Brooks, 1968). The task for the readers involved checking along a line of letters to count and record the number of occurrences of a specific letter (a, e or o). Five of these counting tasks were presented after each story. The listeners were required to listen to a string of words, count and subsequently record the number of occurrences of words starting with a specific letter (m, s, t). Five word strings were presented after each story.

All materials were collated into booklets. The booklets for

the readers contained the four stories, four sets of statements plus four series of distractor tasks, in the order: story, abstractor task, statements (appropriate to the preceding story) and so on. The four stories were presented in a random order fixed across subjects. The statement sheets were set out as follows. The two alternative statement pairs were written one above the other and were numbered 1A, 1B through 12A, 12B. At the right hand side of the response sheet was a column in which the child could write Yes (the statement was presented in the story) or No (the statement was not presented in the story).

The booklets for the listeners contained a set of four blank sheets for the child to record the answers to the distractor tasks plus four sheets for responses to the statements. The left hand side of this response sheet contained the numbers 1A, 1B through to 12B. The right hand side contained a column where the child could write Yes (the statement was presented in the story) or No (it was not presented in the story).

Procedure. The children were tested in groups of 18, i.e., subjects in each grade and each experimental condition were seen separately. Different instructions were given to the readers and listeners. The readers were told that they would be required to read some stories and then answer some questions. They were informed that the questions were of a special kind requiring the selection of the most appropriate answer from two alternatives. The children were instructed to read both alternatives carefully and to put a checkmark against the most appropriate one i.e., the one which fit in best with the story. They were then told to try to decide whether the statement they picked as the better, or more appropriate one

had actually been presented in the story. Specifically, the children were asked to "Pick the best answer" and then decide "Did the story actually say this?". Several examples were given to ensure that all the children understood that they were to make two responses and to ensure that they were aware of the difference between a statement which is explicitly presented and a statement which is compatible with the explicit propositions but which is inferred.

The children worked through the stories and distractor tasks in the predetermined order. They were encouraged to seek assistance if they had trouble reading any of the words. The children worked at their own rate. The task took between 30 and 45 minutes to complete, depending upon the child's reading level.

The children in the listening groups were told that they would hear some stories and some questions. They were informed that their task was to select the most appropriate answer from two alternatives. They were instructed to place a checkmark against alternative A or B, whichever was the more appropriate, and then to decide whether that alternative had actually been presented in the story. They recorded Yes or No as the readers had done. Several examples were presented to ensure that all the children understood the task. The experimenter then read out the first story followed first by the distractor task, and then by the set of statements. The order of presentation of the stories was the same as for the readers. The entire procedure took approximately 30 minutes.

Note that the readers were required to read all the experimental materials (stories, distractor tasks and statements). The listeners heard the stories, distractor tasks and statements.

RESULTS

Two separate analyses were computed on the data. The first concerned the child's selection of the most appropriate statement and the second concerned the assignment of that statement to the Explicitly presented versus Not presented categories.

The five-way ANOVA (Grade x Reading/Listening x Structural/Incidental x Implicit/Explicit x Subjects) computed on the total correct forced-choice selection for each statement type (max = 12), revealed the following significant main effects and interactions: Structural/Incidental ($F(1,68) = 52.87$, $p < 0.001$); Implicit/Explicit ($F(1,68) = 21.20$, $p < 0.001$); Reading/Listening x Structural/Incidental ($F(1,68) = 13.96$, $p < 0.001$); Reading/Listening x Implicit/Explicit ($F(1,68) = 12.83$, $p < 0.001$); Grade level x Reading/Listening x Implicit/Explicit ($F(1,68) = 10.49$, $p < 0.01$). All main effects and interactions are contained within just two interactions which will be considered in detail.

Figure 1 shows the interaction of Reading/Listening with Structural/

Insert Figure 1 about here

Incidental. A test for simple main effects indicated that both the readers ($p < 0.05$) and the listeners ($p < 0.001$) made fewer errors in selecting the correct Structural statements than in selecting the correct Incidental statements. The readers (86% correct) and listeners (88% correct) performed at approximately the same level on the Structural items. Performance on the Incidental items was not equivalent however, and the readers (81% correct) obtained significantly higher scores ($p < 0.01$) than the listeners

(72% correct). Here, then, is support for the first hypothesis: both readers and listeners score highly on items which are relevant to the structure of the story; listeners are poorer than readers on items concerning irrelevant details.

The means for the significant three-way interaction of Grade level by Reading/Listening by Implicit/Explicit are shown in Table 2. A

Insert Table 2 about here

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test for simple interaction effects indicated a significant interaction only in the Grade 3 data ($p < 0.001$; Grade 5: $F < 1.0$). Tests of simple main effects showed that the Grade 3 readers recalled significantly more explicit (89%) than implicit (75%) facts ($p < 0.001$) and the performance of these Grade 3 readers on Explicit facts was significantly higher than the performance of the Grade 3 listeners (77%; $p < 0.01$). In other words, the Grade 3 readers really excelled in their selection of correct alternatives for the Explicitly presented facts. Note, however, that overall performance in all cells was relatively high, hence the lack of interaction in the Grade 5 data may simply be the result of a ceiling effect.

The dependent variable in the second five-way ANOVA was the number of correct decisions (max = 12) the child made concerning whether or not the statement selected as appropriate had actually been presented in the story. The significant main effects and interactions were as follows: Grade ($F(1,68) = 13.81$, $p < 0.001$); Reading/Listening ($F(1,68) = 6.9$, $p < 0.05$); Implicit/Explicit ($F(1,68) = 123.99$, $p < 0.001$); Structural/Incidental x Implicit/Explicit ($F(1,68) = 12.16$, $p < 0.001$); Reading/

Listening x Structural/Incidental x Implicit/Explicit ($F(1,68) = 14.45$, $p < 0.001$).

The Grade level effect was such that the Grade 5 children (69% correct) were significantly more accurate in their judgements on whether the statements had occurred in the stories than the Grade 3 children (61% correct).

The other significant main effects and interactions are all contained within the significant three way interaction, which is depicted in Figure 2. Tests for simple interaction effects indicated a significant

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Insert Figure 2 about here

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interaction in the Listening group ($p < 0.001$) but no interaction in the reading group ($F < 1.0$). Tests for simple simple main effects revealed that the readers were more accurate with the Explicit statements than the Implicit statements ($p < 0.001$) irrespective of whether the items were Structural or Incidental. The Listeners were also more accurate with the Explicit than Implicit statements. However they made more errors on the Implicit Structural statements than on the Implicit Incidental statements ($p < 0.001$) and they made fewer errors on the Structural Explicit statements than Incidental Explicit statements ($p < 0.01$).

That is, children who listen tend to assert that Structural statements were presented in the Text even when they were, in fact, inferred. Thus they say both that implicit structural items were in the text when they were not, and that explicit incidental items were not in the text when in fact they were. Readers, on the other hand, are more aware of what was presented explicitly and what was inferred whether or not the statements were

structurally important. Readers moreso than listeners knew what the text had stated. These data provide support for the second hypothesis.

DISCUSSION

The Grade 3 and Grade 5 subjects in this study were all able to extract the story meaning, as evidenced by their extremely high performance in selecting those statements best fitting into the general story structure. However, as Figure 1 showed, those children who listened to the narrative stories were found to pay more attention to statements which were concerned with the central events of the story than to statements about irrelevant or peripheral events. The Grade 3 and Grade 5 children who read the narrative stories were able to pay closer attention to these irrelevant details. In other words, children appear to listen wo what was meant, but are able to read what was said.

For listeners in both Grade 3 and Grade 5 the selection of the correct alternatives was as accurate for Implicit statements as for Explicit statements, regardless of their structural importance. For readers of both grade levels, however, the selection of correct alternatives was more accurate for Explicit items than for Implicit ones, with this advantage of Explicit over Implicit gaining significance for the Grade 3 children. In general, then, the readers were better at recalling explicit facts, again providing support for the hypthesis that you listen to what was meant, the story gist, but read what was, in fact, said.

In judging whether or not the statements had actually been presented in the story, both the readers and the listerns were biased towards a YES response, with the result that performance on statements which were

in fact explicit (mean of 84% correct) was markedly better than performance on the Implicit statements (mean of 46% correct). However, performance was not equivalent across the four statement types for the readers and listeners.

For Explicit statements, whether Structural or Incidental, the readers were very accurate in deciding that these statements had indeed been presented explicitly. Performance by the readers on both types of Implicit statements (Incidental Implicit and Structural Implicit) was at chance level. Thus even by Grade 5, children are not yet very accurate in differentiating inferences from explicitly presented propositions.

The performance of the listeners was very different. Although the listeners performed at about chance level on Incidental Implicit statements, they were far less accurate in their decisions on Structural Implicit statements. The listeners tended to think that Structural Implicit statements, i.e., those statements essential to the coherence of the story which we have called Enabling Inferences, were presented explicitly in the story. The listeners were accurate in their assessment of these statements only 35% of the time. Furthermore, although the readers were equally accurate in their judgements of Structural Explicit and Incidental Explicit statements, performance of the listeners was not equivalent. These subjects were more accurate on the Structural Explicit statements than on the Incidental Explicit statements, again pointing to the fact that the listeners were paying closer attention to what was meant.

The Grade 5 children were superior overall to the Grade 3 children on decisions about whether the statements had been explicitly stated or were inferred. This suggests that the ability to differentiate between explicit statements and inferred but appropriate statements is

developmental in nature, and is, perhaps, related to literacy. Subsequent analyses will be performed on these data to determine if good readers are, as we predict, better able to differentiate between explicit and inferred statements.

In sum, it appears that readers and listeners do adopt different strategies when comprehending narrative discourse. The listeners pay more attention to the theme of the story, building a coherent representation of what was meant. The readers, on the other hand, are able to pay closer attention to the explicit statements per se, recalling more incidental details and being more accurate in their judgements of what was, in fact, written. It is, presumably, only with literate training that children become able to differentiate what was meant from what was said, or as Olson has stated elsewhere (Olson, 1977) to constrain their interpretation to the explicitly presented text.

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Reference Note

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TABLE 1

Example of Story and Statement Types

SUSAN and JONATHAN

Susan and Jonathan lived in a house in the middle of the city. At the end of their backyard there was a large maple tree. Susan and Jonathan often played under the maple tree in their sandbox.

One morning they found something in the sand. It was tiny and white. Susan went into the house to find a container to put it in. She went up to her bedroom and came back carrying a black and white box. "It's too big," said Jonathan.

So Susan found a handkerchief and some kleenex. They put the handkerchief on the bottom of the box and laid the tissues on top of the handkerchief. Jonathan carefully laid the strange thing on the tissues.

Next morning their teacher was interested in what they had found and gave the whole class a lesson on how birds' eggs hatch.

1. Structural Implicit:

   Susan and Jonathan found a bird egg.

2. Structural Explicit:

   What they found was small and white.

3. Incidental Implicit:

   The sand box was at the end of the backyard.

4. Incidental Explicit:

   They lived in the city.

TABLE 2

Mean percent selection of the more appropriate Implicit and Explicit Statements by Grade 3 and Grade 5 Readers and Listeners

Grade 3	Readers	Listeners
Implicit Statements	75	78
Explicit Statements	89	77
Grade 5	**Readers**	**Listeners**
Implicit Statements	83	81
Explicit Statements	86	83

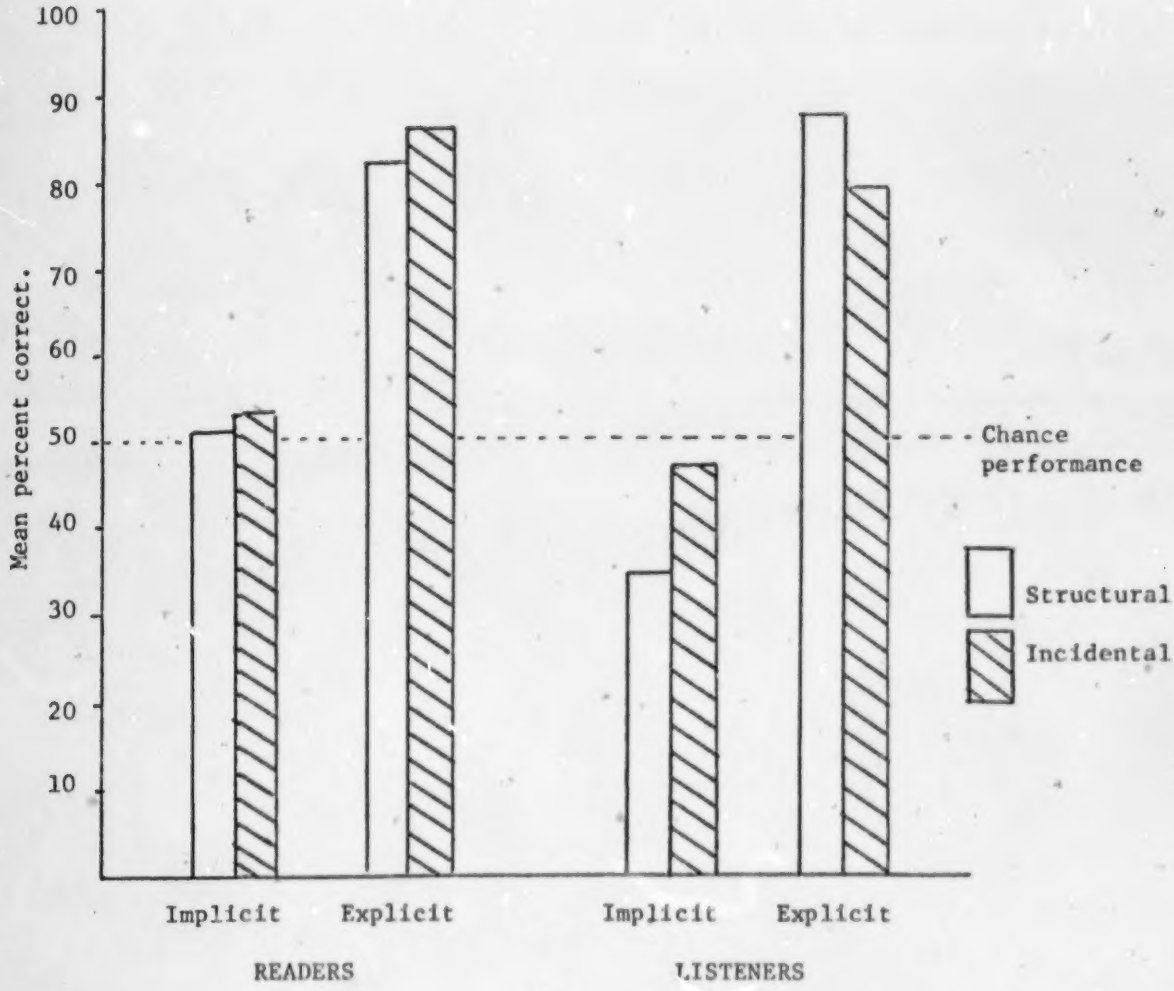

FIGURE 2

Percent correct differentiation by Readers and Listeners of those appropriate Structural and Incidental statements which were inferred from those which were presented explicitly.

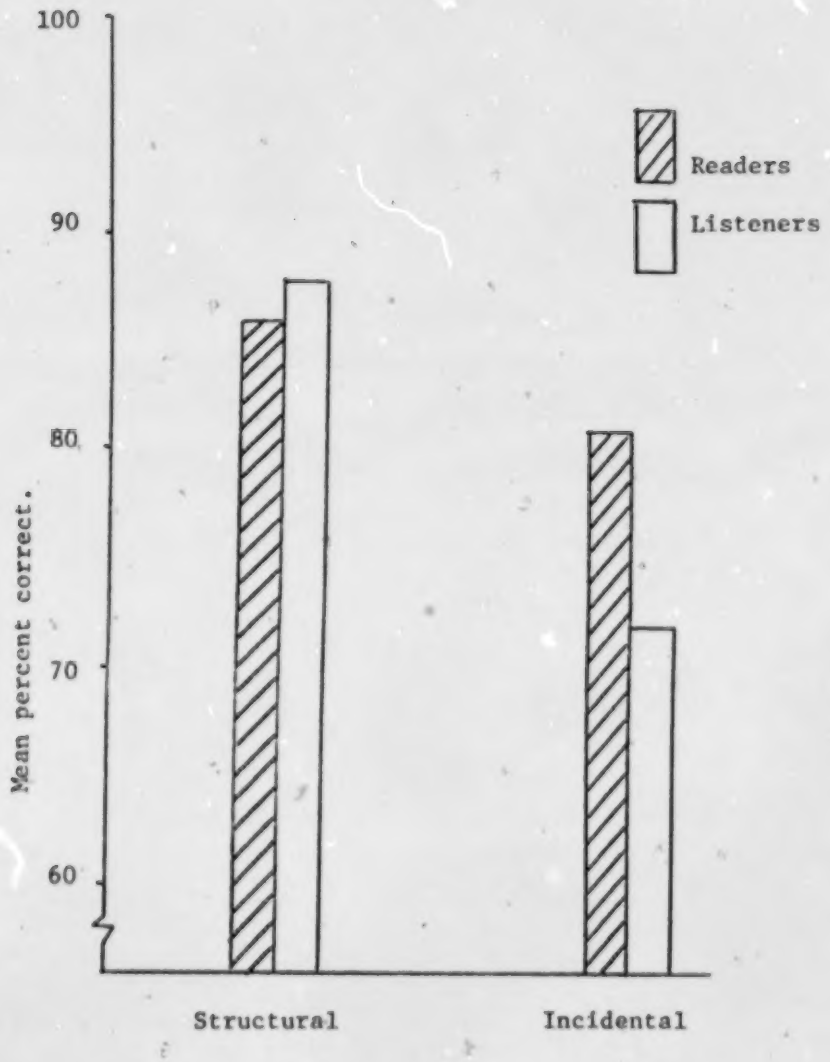

FIGURE 1

Percent correct selection of the most appropriate Structural and Incidental statements by Readers and Listeners.